PATENT

#17 Appeal Brief 6/22/03 cpy

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:		
Yong-Jun Hu		Examiner: Joseph Nguyen
Serial No.: 09/826,661		Group Art Unit: 2815
Filed: April 5, 2001		Docket: 303.098US4
For: LOW ANGLE, LOW ENERGY PHYSICAL VAPOR DEPOSITION OF ALLOYS		

APPELLANTS' BRIEF ON APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

Sir:

This Brief is presented in response to the Final Office Action mailed April 3, 2003, rejecting claims 48-54, 71-73, 75, 76, 82-89, 91-100, 102, 103, and 105-116 of the above identified Application, and further to the Notice of Appeal mailed July 3, 2003, received by the USPTO on July 10, 2003. All of the forty-four rejected claims remain for consideration in this Appeal.

The Appeal Brief is filed in triplicate. Appellant authorizes the Office to charge the requisite fee of $330.00 as set forth in 37 CFR. 1.17(c), and any other fees which may be due, to Deposit Account 19-0743. Appellant reserves the right to submit a request for an oral hearing at a later time.

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1. REAL PARTY IN INTEREST

The real party in interest of the above-captioned patent application is the assignee of record, MICRON TECHNOLOGY, INC..

2. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences that bear on the Board's decision in the present Appeal are known to Appellant.

3. STATUS OF THE CLAIMS

Claims 48-54, 71-73, 75-76, 82-89, 91-100, 102-103, and 105-116 are currently pending, and are all finally rejected. Appendix I lists the claims on appeal.

4. STATUS OF AMENDMENTS

No amendments have been made subsequent to the Office action mailed to Appellants on April 3, 2003.

5. SUMMARY OF THE INVENTION

Semiconductor manufacturing continues to crowd conductive lines and other devices closer together on a chip. But the thickness of the layers between these devices remains about the same, so that contact holes from one plane of conductors to another, or to an underlying semiconductor substrate, become taller and narrower. Fabricating a contact hole involves forming a recess in an insulating layer, then placing a conductive material in a thin flat layer at the very bottom to establish a good electrical contact with the device below it. When the underlying device is a semiconductor substrate, it is important that the bottom layer of the contact hole should change the chemical composition of the substrate below the hole as little as possible, to avoid degrading its performance.

Applicant has invented a contact hole that minimizes degradation of a semiconductor substrate below it. One of structural features (referred to as "Feature (A)" hereinafter) of such a hole is a layer at the very bottom of the hole that has a "graded stoichiometry" within the layer

itself. That is, the relative proportions of the same two chemical elements in the thin layer itself change within the layer at the bottom of the hole. Another structural feature ("Feature (B)") expresses a consequence of the graded stoichiometry, that the profile of the substrate does not change with depth because of intrusion of the hole's bottom layer. Another structural feature ("Feature (C)") expresses this concept more quantitatively, in that the bottom layer of the hole extends below the hole into the underlying substrate for less that a certain depth.

Fig. 3B of the Application shows a semiconductor substrate 310 underlying an insulating layer 312. Contact hole 314 pierces insulator 312. Numerals 354, 356 indicate a thin bottom layer having a graded stoichiometry at different depths.[1] The Specification describes an example of a graded stoichiometry between two elements, silicon and titanium, within the bottom layer itself at page 15 line 15 to page 16 line 22. This passage also includes a specific method for modifying the bottom layer to a graded stoichiometry from the constant value of other described embodiments.

The Specification describes two specific measures of the hole contact layer's extension into a silicon substrate. At page 3 lines 14-15, the amount of substrate silicon consumed in forming the contact layer is twice as thick as the titanium contact layer. Page 15 lines 5-8 relate the silicon penetration in terms of equilibrium ratio of a titanium contact material and a silicon substrate material. The following text, page 15 lines 8-10, states this concept more broadly: the profile of substrate 310 does not change significantly when contact layer 354 forms on top of it.

6. ISSUES PRESENTED FOR REVIEW

The PTO has improperly read into the cited references three claimed features that were supplied entirely from Applicant's disclosure, features that find no basis in the references themselves. In particular:

- The PTO improperly read into both the Chen and BeBruin references a graded stoichiometry within the bottom layer of a contact hole (Feature (A) in the Summary just above).

[1] -- Although Fig. 3B shows two separate layers, the grading can also be considered to occur in a single graded layer as shown in Fig. 3A. The Specification, at page 15 lines 18-20, notes that graded stoichiometry is applicable to all the described embodiments. Lines 24-25 state that a "series of material layers [plural]" results in "a thin film [singular]" having the graded stoichiometry.

- The PTO improperly read into both the Chen and DeBruin references a substrate profile characteristic (Feature (B) above).
- The PTO improperly read into both the Chen and DeBruin references specific hole penetration depths (Feature (C) above).

To simplify the issues on appeal, Applicant admits that the Chen reference itself may apply to "high aspect ratio" holes as well as to those of lower ratios. Therefore, the 35 USC 103 rejection of claim 49 under Chen in view of Miyamoto may be treated as a 35 USC 103 rejection under Chen alone.

7. GROUPING OF CLAIMS

(1) Claims 48-54, 82, 83, 85, 86, 105, 106, and 108-114 stand and fall together in this Appeal. These claims are drawn to Feature (A) above, and were rejected under 35 USC 102 because of both Chen and DeBruin.

(2) Claims 84 and 107 stand and fall together in this Appeal. These claims are drawn to Feature (A) above, and were rejected under 35 USC 102 because of Chen alone.

(3) Claims 71-76, 98-103, 115, and 116 stand and fall together. They are drawn to Feature (B) above, and were rejected under 35 USC 102 because of both Chen and DeBruin.

(4) Claims 87-89 and 91-96 stand and fall together. These claims are drawn to Feature (C) above, and were rejected under 35 USC 102 because of DeBruin, and under 35 USC 103 because of Chen.

(5) Claim 97 stands alone in this Appeal. It is drawn to Feature (C) above, and was rejected under 35 USC 103 because of Chen alone.

As an equivalent alternative view, the following paragraphs list the allowable claims in terms of the features from the preceding section.

As to Feature (A), above:

- Overcoming the 35 USC 102 Chen rejection by itself renders allowable claims 84 and 107, *i.e.*, the claims in Group (2) above..

- Overcoming both the 35 USC 102 Chen rejection and the 35 USC 102 DeBruin rejection renders allowable claims 48, 50-54, 82-86, and 105-114, the claims in Groups (1) and (2).

As to Feature (B) above:

- Overcoming both the 35 USC 102 Chen rejection and the 35 USC 102 DeBruin rejection renders allowable claims 71-76, 98-103, 115, and 116, the claims in Group (3).

As to Feature (C), above:

- Overcoming the 35 USC 103 Chen rejection by itself renders allowable claim 97, the only claim in Group (5).
- Overcoming both the 35 USC 103 Chen rejection and the 35 USC 102 DeBruin rejection renders allowable claims 87-97, the claims in Groups (4) and (5).

8. ARGUMENT

A) 35 USC 102(e) Rejections

1) Applicable Law

35 U.S.C. 102(e) states, in relevant part:

> A person shall be entitled to a patent unless
> ....
> (e) the invention was described in—
> ....
> (2) a patent granted on an application filed by another in the United States before the invention by the applicant for patent....

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros., Inc. v. Union Oil Co. of California*, 814 F.2d 628, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987).

When a rejection relies upon an inherent characteristic, extrinsic evidence "'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary

skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 49 USPQ2d 1949, at 1950-51 (Fed. Cir. 1999), quoting *Continental Can Co. v. Monsanto Co.*, 20 USPQ2d 1746 at 1746, 1749 (Fed. Cir. 1991), quoting *In re Oelrich*, 212 USPQ 323 at 326 (C.C.P.A. 1981) In the words of the Board, "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USQP2d 1461 at 1464. (Bd. Pat. App. & Inter. 1990), emphasis in original.

2) As to the Group 1 claims, DeBruin does not teach a planar layer having a "graded stoichiometry" on the bottom surface of a contact hole.

Page 2 of the final Office action dated April 3, 2003 rejects the claims of Group 1 by asserting that Fig. 4 of DeBruin discloses a contact hole having a planar layer having a graded stoichiometry.[2] However, DeBruin varies the stoichiometry of a layer on the sidewall of the hole from the top of the hole to the bottom of the hole; see col. 4 lines 10-13. DeBruin says nothing as to any graded characteristics within the bottom layer itself. In fact, it would be disadvantageous to do so; DeBruin's purpose in varying the sidewall proportions during manufacture is to later destroy this layer near the top of the hole while leaving it intact at the bottom.

It is not permissible to impute the characteristics of one part of a structure in a reference to another part *Verve LLC v. Crane Cams Inc.*, 65 USPQ2d 1051 (Fed. Cir. 2002), held no anticipation where a claimed pushrod had a larger diameter at the middle and a narrower diameter at the ends, while the reference had uniform diameter in the middle and wider/narrower parts at its ends. Furthermore, *Ex parte Levy, supra*, held that a characteristic of a starting

[2] -- The independent claims of group 1 express this feature (Feature (A)) as:

48. "... a generally planar layer ... covering only the bottom surface ... having a graded stoichiometry between a refractory metal and" the bottom material of the hole."

82. " ... one generally planar layer ... having a graded stoichiometry between two different constituent elements in the bottom layer."

106. "... at least one generally planar layer ... covering the bottom surface ... where the planar layer has a graded stoichiometry."

108. "... a generally planar layer ... having a graded stoichiometry on the bottom."

material (biaxially oriented plastic) cannot be imputed to the finished product (biaxially oriented catheter balloon) without objective evidence or cogent technical argument to support such a finding.

Accordingly, the claims in Group (1) distinguish over the DeBruin reference.

3) As to the Group 1 and 2 claims, Chen does not teach a planar layer having a "graded stoichiometry" on the bottom surface of a contact hole.

Page 4 of the final Office action dated April 3, 2003 rejects all the claims of Groups 1 and 2 above only on the following statement: "Chen discloses on [sic] figure 3B all the structures set forth in the claimed invention."[3]

Independent claim 48 recites a planar layer covering only the bottom surface, the material whereof has a "graded stoichiometry" between the same two elements, here a refractory metal and the hole's bottom surface material. Chen's Fig. 3b shows a layer 34A having titanium and silicon. Applicant finds no express mention within the Chen reference that the ratio of these two elements is graded in any way. Chen's statement at col. 3 lines 51-52 of a "$TiSi_x$ film 34 ... with x being 1.1 to 1.8" would be taken by those in the art to indicate that x may assume any one value within the indicated range, and not that x might vary over the depth of the film. In col. 4 lines 20-21, Chen speaks of a step to "convert the $TiSi_x$ film to a $TiSi_{2.0}$ film." Again, one skilled in the art would interpret this as converting all of the film to a different proportion, and not as converting it to different proportions at different depths. To imply that Chen might vary the stoichiometry of layer 34 over the depth of the film is to import Applicant's invention into the reference without any basis in the reference for doing so.

Chen may vary the relative proportions of two elements in layer 37 of his hole 35; see col. 2 lines 26-28. However, this layer is located above the bottom of the hole, separated from the bottom by intervening layer 34A, which is located at the bottom. Layer 37 can not achieve Applicant's purpose of avoiding degradation below the bottom of the hole, because it

[3] -- The relevant recitations of Group 1 are listed above. The dependent claims of Group (2) express Feature (A) in their respective parent claims of Group (1), namely claims 82 and 106.:

does not reach the bottom of the contact hole.[4] It is not permissible to impute the characteristics of one part of a structure in a reference to another part.

Accordingly, the claims in Groups (1) and (2) distinguish over the Chen reference.

4) As to the Group 3 claims, DeBruin does not teach a contact hole where the underlying substrate has an unchanging depth profile under the hole.

Page 3 of the Office action states that DeBruin discloses "a substrate that does not change significantly in the vicinity of the contact hole 13" without further support for this assertion.[5]

A changing substrate profile indicates penetration of the bottom layer of a contact hole into the substrate, which degrades its performance. It is well known that such penetration occurs unless specific steps are taken to reduce it. The Specification at page 3 lines 7-15, notes this effect, and states a particular amount of prior-art penetration at lines 14-15 which the invention avoids by a sputtering/resputtering process dedicated to that goal. DeBruin appears not to recognize this problem. The Office action does not controvert Applicant's assessment of the penetration problem, yet adduces no basis for supposing that DeBruin does not suffer from it.

Accordingly, the claims of Group (3) define over the DeBruin reference.

5) As to the Group 4 claims, DeBruin does not teach a contact hole where the bottom layer penetrates into a substrate less than a specific recited distance.

Page 4 of the Office action dismisses the claims of Group (4) entirely on the basis that "DeBruin discloses on [sic] figure 4 all the structures set forth in the claimed invention."[6]

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[4] -- In fact, Chen's purpose in varying the proportions in layer 37 is to increase adhesion; col. 2 lines 35-37.

[5] -- The independent claims of group 5 express this feature (Feature (B)) as:

71. "... a substrate having a profile that does not change significantly in the vicinity of the contact hole."

98. "... where the profile of the substrate does not change substantially in the vicinity of the contact hole."

[6] -- The independent claims of group 3 express this feature (Feature (C)) as:

87. "... the bottom layer extending into the substrate less than twice the distance from the top of the bottom layer to the top of the substrate."

93. "... the silicide extending below the top of the substrate a distance less than the equilibrium

The Specification (page 15 lines 8-10) notes that the bottom layer of the present contact hole alters the profile less than does the prior art. Page 3 lines 14-15 state a prior-art substrate penetration depth that the invention overcomes; this amount is the basis for the recitation in independent claim 87. Page 15 lines 3-8 describe the functional depth recitation in independent claim 93, and give an example for a particular material. Applicant has not found any express or inherent suggestion of any particular penetration depth in DeBruin. Indeed, as noted in connection with Group (3) above, DeBruin does not seem even to recognize that the bottom layer of a contact hole penetrates the substrate and degrades it.

Accordingly, DeBruin cannot anticipate the claims of Group (4) under 35 U.S.C. 102.

6) As to the Group 5 claim, Chen does not teach a contact hole where the underlying substrate has an unchanging depth profile under the hole.

Page 4 of the Office action rejects the claim of Group 5 only on the following statement: "Chen discloses on [sic] figure 3B all the structures set forth in the claimed invention."

Chen recognizes the degradation problem caused by hole penetration; col. 3 lines 36-37. He attempts to ameliorate the problem, however, with an implant layer 32; col. 3 lines 42-43. From the point of view of the claim, this layer changes the substrate profile more, not less.[7]

Accordingly the claim of Group (5) distinguishes the Chen reference.

B) 35 USC 103(a) Rejections

1) Applicable Law

The Examiner has the burden under 35 U.S.C. 103 to establish a prima facie case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In adopting the reasoning of *In re Vaeck*, 20 USPQ2d 1438 (Fed.Cir. 1991), section 2142 of the M.P.E.P requires three criteria for the Office to establish prima facie obviousness:

---

ratio of the metal and the substrate material times the thickness of the bottom layer above the top of the substrate."

[7] -- It also has the technical disadvantage of requiring precise alignment, since the implant is formed prior to the hole.

> "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference.... Second, there must be a reasonable expectation of success. Finally, the prior art reference ... must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Appellant's disclosure."

The fact that a reference can be modified does not render the resultant combination obvious unless the prior art also suggests the desirability of doing so. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. A rejection under 35 U.S.C. §103 must be based upon references that constitute prior art under at least one of the provisions of 35 U.S.C. 102; *Panduit Corp. v. Dennison Mfg. Co.*, 1 USPQ2d 1593 (Fed. Cir. 1986), cert. den. 481 U.S. 1052 (1987). Therefore, the cases restricting inherency also apply to a 35 U.S.C. 103 rejection. In particular, the Office must provide a basis in fact and/or technical reasoning to reasonably support the determination that an allegedly inherent characteristic necessarily flows from an applied prior-art reference; *Ex parte Levy, supra.*

2) As to the Group 4 and 5 claims, there is no basis in Chen for suggesting the claimed specific depth limitations of the bottom layer into the substrate below the layer.

Pages 5 and 6 of the Office action admit that Chen does not teach at all the particular distance recitations of the independent claims[8] of Groups (4) and (5). The basis for the rejection is that, because Applicant's goal is to improve the structure of a semiconductor device, "discovering the optimum value of a result effective variable involves only routine skill in the art" (page 6, two occurrences), citing *In re Boesch*, 205 USPQ 215 (C.C.P.A. 1980).

Applicant admits to not having discovered the optimum penetration depth (zero), and does not claim it. Rather, the claims recite a range of depths, one of which is absolute (claim 87), the other being a function of the materials employed in the contact hole (claim 93). The ultimate optimum depth of zero is unobtainable in this type of structure, by Applicant or anyone else; Applicant has discovered how to reduce it below a certain amount, and the cited reference does not show or suggest that amount.

[8] -- Claims 87 and 93, above,. Are the only independent claims in Groups (4) and (3).

Accordingly, the claims of Groups (4) and (5) define over the teachings of the Chen reference in a patentable manner under 35 USC 103.

9. SUMMARY

The claims on appeal are divided into five groups according to various rejection on three different recited in various ones of the claims. In view of the above arguments, Applicant respectfully requests reversal of all the rejections. A finding of no anticipation or non-obviousness on either of the cited references to DeBruin and Chen on any of the features results in the allowability of some of the claims, as noted in the section titled "Grouping of Claims."

Should the Board believe that a rejected claim may be allowable in amended form, an indication to that effect is earnestly requested.

Respectfully submitted,

Yong-Jun Hu

By his Representatives,

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Date 3 Oct 2003 By _____
J. Michael Anglin
Reg. No. 24,916

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Appeal Brief, Commissioner of Patents, P.O.Box 1450, Alexandria, VA 22313-1450, on this 3rd day of October, 2003.

Name Dawn M. Poole Signature _____

APPENDIX I : The Claims on Appeal

48. A contact hole for a semiconductor device, comprising:

a bottom surface of a first material;

at least one vertical sidewall of a second material;

a generally planar layer of a third material covering only the bottom surface, the third material having a graded stoichiometry between a refractory metal and the first material.

49. The contact hole of claim 48 where the hole has a high aspect ratio.

50. The contact hole of claim 48 where the first material is silicon.

51. The contact hole of claim 48 where the second material is an insulator.

52. The contact hole of claim 48 where the planar layer contacts the sidewalls.

53. The contact hole of claim 52 where the third material is substantially confined to the bottom of the hole.

54. The contact hole of claim 48 where the third material is a silicide.

71. In a semiconductor device, a contact hole in a layer of insulator material directly overlying the substrate, the hole comprising:

a bottom surface having at least one generally planar layer of conductive material including a silicide of a refractory metal;

a substrate having a profile that does not change significantly in the vicinity of the contact hole; and

a vertical sidewall consisting substantially entirely of the aforementioned layer of insulator material.

72. The device of claim 71 where the planar layer contacts the lower end of the sidewall.

73. The device of claim 72 where the planar layer does not extend substantially up the sidewall from the bottom surface.

75. The device of claim 71 where the planar layer is titanium silicide.

76. The device of claim 75 where the refractory metal is cobalt.

82. In a semiconductor device having a substrate, a contact hole in a layer of insulator material directly overlying the substrate, the hole comprising:

a vertical sidewall consisting substantially entirely of the aforementioned layer of insulator material; and

a bottom surface having at least one generally planar bottom layer of conductive material having a graded stoichiometry between two different constituent elements in the bottom layer.

83. The device of claim 82 where the substrate is silicon and the insulator material is an oxide, a nitride, or a glass.

84. The device of claim 82 where the planar layer comprises multiple layers having mutually different stoichiometries.

85. The device of claim 82 where the conductive material includes a silicide of a metal.

86. The device of claim 85 where the metal is a refractory metal.

87. In a semiconductor device having a substrate, a contact hole in a layer of insulator material directly overlying the substrate, the hole comprising:

a bottom surface having at least one generally planar bottom layer of a conductive material including a silicide of a refractory metal, the bottom layer extending into the substrate less than twice the distance from the top of the bottom layer to the top of the substrate; and

a vertical sidewall comprising the aforementioned layer of insulator material and being free of the conductive elements.

88. The device of claim 87 where the planar layer contacts the lower end of the sidewall.

89. The device of claim 88 where the planar layer does not extend substantially up the sidewall from the bottom surface.

91. The device of claim 87 where the planar layer is titanium silicide.

92. The device of claim 91 where the refractory metal is cobalt.

93. In a semiconductor device having a substrate, a contact hole in a layer of insulator material directly overlying the substrate, the hole comprising:

a bottom surface having at least one generally planar bottom layer of conductive material including a silicide of a metal, the silicide extending below the top of the substrate a distance less than the equilibrium ratio of the metal and the substrate material times the thickness of the bottom layer above the top of the substrate; and

a vertical sidewall comprising the aforementioned layer of insulator material, and being substantially free of the metal.

94. The device of claim 93 where the metal is a refractory metal.

95. The device of claim 93 where the insulator material is an oxide, a nitride, or a glass.

96. The device of claim 93 where the planar layer has a graded stoichiometry.

97. The device of claim 96 where the planar layer comprises multiple layers having mutually different stoichiometries.

98. An integrated circuit, comprising:

a substrate;

a layer of insulating material overlying the substrate and containing at least one contact hole having only that layer as a sidewall and having a bottom surface contacting the substrate; and

at least one generally planar layer of a silicide of a refractory metal, where the profile of the

substrate does not change substantially in the vicinity of the contact hole.

99. The integrated circuit of claim 98 where the planar layer contacts the lower end of the sidewall.

100. The integrated circuit of claim 99 where the planar layer does not extend substantially up the sidewall from the bottom surface.

102. The integrated circuit of claim 98 where the planar layer includes a silicide of titanium.

103. The integrated circuit of claim 102 where the refractory metal is cobalt.

105. The integrated circuit of claim 106 where the planar layer contacts the lower end of the sidewall.

106. An integrated circuit, comprising:

a substrate;

a layer of insulating material overlying the substrate and containing at least one contact hole having only that layer as a sidewall and having a bottom surface contacting the substrate; and

at least one generally planar layer of conductive material covering the bottom surface, the planar layer including a silicide of a metal, the metal being substantially entirely confined to the bottom surface in the hole, where the planar layer has a graded stoichiometry.

107. The integrated circuit of claim 106 where the planar layer comprises multiple layers having mutually different stoichiometries.

108. A contact hole for a semiconductor device, comprising:
a bottom surface of a first material;
at least one vertical sidewall of a second material;
a generally planar layer of a silicide having a graded stoichiometry on the bottom surface.

109. The contact hole of claim 108 where the silicide includes titanium.

110. The contact hole of claim108 where the silicide includes cobalt.

111. The contact hole of claim 108 where the first material is silicon.

112. The contact hole of claim 108 where the second material is an insulator.

113. The contact hole of claim 108 where the third material is graded only on the bottom of the hole.

114. The integrated circuit of claim 106 where the contact hole has a high aspect ratio.

115. The device of claim 71 where the profile changes less than twice the thickness of the generally planar layer.

116. The integrated circuit of claim 98 where the profile changes less than twice the thickness of the generally planar layer.

APPENDIX II : Prosecution History

Date	Item	Claims	Action	References
04/05/01	Application	1-30	File	
04/05/01	Preliminary amendment	1-30	Cancel	
		31-70	Add new	
11/26/01	Office action	31-34 36-37 39-47 55-58	Reject 35USC102(e)	Miyamoto
		31-35 37-38 42, 48 50, 54 56-58	Reject 35USC102(e)	Chen
		49	Reject 35USC103(a)	Chen, view of Miyamoto
		59-64	Reject 35USC103(a)	Chen or Miyamoto, view of Thomas
		65-70	Reject 35USC103(a)	Chen & Miyamoto, view of Thomas
01/26/02	Response	38	Cancel	
		31, 39 43, 48 55, 59 63-65	Amend	
04/24/02	Office action (final)	31-34 36-37 39-47 55-58 59-70	Reject 35USC102(e)	Miyamoto
		31-35 37, 42 48 50-54 56-70	Reject 35USC102(e)	Chen
		49	Reject 35USC103(a)	Chen, view of Miyamoto
08/19/02	Response after final	31-37 39-47 55-70	Cancel	
		71-107	Add new	
09/18/02	Advisory action		Response refused entry	

Date	Item	Claims	Action	References
09/24/02	Request for continued examination		Consider previous response	
11/26/02	Office action	48 50-54 71-83 85-96 98-106	Reject 35USC102(e)	Sim
		48 50-54 71-83 85-96 98-106	Reject 35USC102(e)	DeBruin
		48 50-54	Reject 35USC102(e)	Chen
		49	Reject 35USC103(a)	Chen, view of Miyamoto
		84, 97 107	Reject 35USC103(a)	Sim, view of Chen
02/26/03	Response	74 77-81 101 104	Cancel	
		48, 71 75-76 87 91-93 98 102-103	Amend	
		108-116	Add new	
04/03/03	Office action (final)	48 50-54 71-73 75-76 82-83 85-89 91-96 98-100 102-103 105-106 108-116	Reject 35USC102(e)	DeBruin

Date	Item	Claims	Action	References
		48 50-54 71-73 75-76 82-86 98-100 102-103 105-116	Reject 35USC102(e)	Chen
		87-89 91-97	Reject 35USC103(a)	Chen
		49	Reject 35USC103(a)	Chen, view of Miyamoto
07/03/03	Notice of appeal			

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Sir:

This Brief is presented in response to the Final Office Action mailed April 3, 2003, rejecting claims 48-54, 71-73, 75, 76, 82-89, 91-100, 102, 103, and 105-116 of the above identified Application, and further to the Notice of Appeal mailed July 3, 2003, received by the USPTO on July 10, 2003. All of the forty-four rejected claims remain for consideration in this Appeal.

The Appeal Brief is filed in triplicate. Appellant authorizes the Office to charge the requisite fee of $330.00 as set forth in 37 CFR. 1.17(c), and any other fees which may be due, to Deposit Account 19-0743. Appellant reserves the right to submit a request for an oral hearing at a later time.

APPELLANT'S BRIEF ON APPEAL
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